When Plants Photosynthesize

another equation to memorize

1. Write the balanced chemical equation for photosynthesis, i.e. the opposite of combustion of glucose a.k.a. cellular respiration.

$$(\text{radiant E}) + \text{sunlight E} + 6CO_{2(g)} + 6H_2O_{(l)} \rightarrow C_6H_{12}O_{6(aq)} + 6O_{2(g)}$$

2. How many moles of glucose will form if 15 moles of carbon dioxide react?

$$15\,\text{mol}\,CO_2 \times \frac{1\,\text{mol glu}}{6\,\text{mol}\,CO_2} = 2.5\,\text{mol glu}$$

3. How many grams of oxygen will form if the plant used 1.5 moles of water?

$$1.5\,\text{mol}\,H_2O \times \frac{6\,\text{mol}\,O_2}{6\,\text{mol}\,H_2O} \times \frac{32\,\text{g}\,O_2}{1\,\text{mol}\,O_2} = 48\,\text{g}\,O_2$$

4. How many moles of carbon dioxide will be used up by a tree producing 5 moles of oxygen?

$$5\,\text{mol}\,O_2 \times \frac{6\,\text{mol}\,CO_2}{6\,\text{mol}\,O_2} = 5\,\text{mol}\,CO_2$$

5. How many grams of glucose will be produced if a plant uses up 35 g of carbon dioxide?

$$35\,\text{g}\,CO_2 \times \frac{1\,\text{mol}\,CO_2}{44\,\text{g}\,CO_2} \times \frac{1\,\text{mol glu}}{6\,\text{mol}\,CO_2} \times \frac{180\,\text{g glu}}{1\,\text{mol glu}} = 23.9\,\text{g glu}$$

6. What mass of oxygen will produce 45 g of glucose?

$$45\,\text{g glu} \times \frac{1\,\text{mol glu}}{180\,\text{g glu}} \times \frac{6\,\text{mol}\,O_2}{1\,\text{mol glu}} \times \frac{32\,\text{g}\,O_2}{1\,\text{mol}\,O_2} = 48\,\text{g}\,O_2$$

7. How many molecules of carbon dioxide will be used up to produce 100. g of oxygen?

CO_2

$$100.\,\text{g}\,O_2 \times \frac{1\,\text{mol}\,O_2}{32\,\text{g}\,O_2} \times \frac{6\,\text{mol}\,CO_2}{6\,\text{mol}\,O_2} \times \frac{6.02\times10^{23}\,\text{molecs}}{1\,\text{mol}\,CO_2} =$$

1.88×10^{24} molecs CO_2